**3GPP TSG SA WG4#116-e meeting S4-211397**

**10th-19th November, 2021** ***revision of S4aI211245***

 ***revision of S4aI211239***

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| *CR-Form-v12.0* |
| **PSEUDO CHANGE REQUEST** |
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|  | **TS 26.502** | **CR** | **–** | **rev** | **–** | **Current version:** | **0.1.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

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| ***Title:***  | pCR to TS 26.502 on reference architecture  |
|  |  |
| ***Source to WG:*** | TELUS |
| ***Source to TSG:*** | S4 |
|  |  |
| ***Work item code:*** | 5MBUSA |  | ***Date:*** | 2021-10-26 |
|  |  |  |  |  |
| ***Category:*** | **D** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),****C*** *(functional modification of feature)****D*** *(editorial modification)*. |  |
|  |  |
| ***Reason for change:*** | Added text in reference architecture for 5G Multicast-Broadcast User Services |
|  |  |
| ***Summary of change:*** |  |
|  |  |
| ***Consequences if not approved:*** |  |
|  |  |
| ***Clauses affected:*** | Several clauses |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** | Changes against skeleton document TS 26.502 v0.1.0 |
|  |  |
| ***This CR's revision history:*** |  |

FIRST CHANGE

# 2 References

[7] 3GPP TS 26.501: "5G Media Streaming (5GMS); General description and architecture".

[8] IETF RFC 3500: "RTP: A Transport Protocol for Real-Time Applications".

[9] IETF RFC 2250: "RTP Payload Format for MPEG1/MPEG2 Video".

NEXT CHANGE

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

**MBS Application Service**: An end-user service for which parts or all of the data are accessible by activating the reception of an MBS User Service.

**MBS User Service:** An abstract transport-level service configured by the MBSF and using one or more MBS Distribution Sessions, possibly in combination with unicast, for the purpose of supporting an MBS-Aware Application via a set of APIs that allows the MBS Client to activate and deactivate reception of the MBS Session.

**MBS Application ingest session:** time, protocols and protocol state (i.e. parameters) provided by an 5MBS application provider for delivery over 5MBS and provided to the 5MBS aware application as an MBS Application Data Session.

**MBS Application data session:** time, protocols and protocol state (i.e. parameters) provided by the MBSTF Client to the 5MBS aware application.

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## 4.2 System description

Editor’s Note: Explanation of fundamental concepts in the MBS User Services architecture.

### 4.2.1 Network architecture

Figure 4.2.1-1 depicts the MBS network architecture defined in clause 5.1 of TS 23.247 [5] using the reference point representation.



Figure 4.2.1-1: Network Architecture for MBS User Service delivery and control

The functions and reference points involved in providing MBS User Services within the MBS System are highlighted in green, in particular:

- Reference point Nmb10, used by the AF/AS to provision MBS User Services in the MBSF by invoking the Nmbsf service.

- Reference point Nmb2, used by the MBSF to configurre and control MBS [Delivery|Distribution] Methods in the MBSTF by invoking the Nmbstf service.

- Reference point Nmb8, used by the MBSTF to ingest content from the AF/AS.

### 4.2.2 User Service network architecture

MBS User Services enable high-level applications to make use of the low-level features of the MBS System. The MBS User Service is provided by the MBSF and MBSTF working in combination. It presents a complete service offering to an end-user, via a set of APIs that allows the MBS Client to activate or deactivate reception of the service.

The MBS User Service architecture depicted in Figure 4.2.2-1 shows the MBS-related entities involved in providing MBS User Service delivery and control. These are described in the following clauses. The MBS Application Provider plays the role of the AF/AS.

 

Figure 4.2.2-1: MBS User Service network architecture

#### 4.2.2.1 MBSF

MBSF supports the following MBS User Service functions:

* User Service announcement.
* Data model for MBS services, including a session model and its mapping to MBS transport.

The User Service Discovery/Announcement function of the MBSF provides session access information, which is consumed by the MBS Client and subsequently used to initiate the reception of an MBS User Service. The session access information may contain information for presentation to the end-user, as well as application parameters used in generating service content for consumption by the MBS Client.

The MBS Application Provider and MBSF interact via reference point Nmb10 to invoke MBS procedures in the control plane, including service provisioning, MBS session operations and QoS management. The Nmbsf service is exposed at this reference point. The MBS Application Provider may interact with the MBSF via the NEF at reference point N33 for MBS-related service exposure. In this case, the Nmbsf service is exposed at reference point Nmb5.

#### 4.2.2.2 MBSTF

The MBSTF performs generic packet transport functions available to any IP multicast-enabled application, such as framing, multiple flows and computation of packet-level FEC. It also performs multicast/broadcast delivery of input objects or object flows. If needed, the MBSTF provides a media anchor point for MBS data traffic and sourcing of IP multicast.

The MBSTF supports the following MBS User Service functions:

* Distribution Methods to allow MBS User Services to use available MBS capabilities, including support for Group Communication delivery.
* File repair.
* Reception reporting.

The MBS Application Provider and MBSTF interact via reference point Nmb8 to support MBS data handling in the user plane.

### 4.2.3 Distribution Methods

Editor’s Note: Explanation of what a distribution method is and what distribution methods are for.

Editor’s Note: Decide whether to refer at all to associated delivery procedures.

The MBS Distribution Methods defined in clause 6 of the present document make use of MBS Sessions (see clause 4.1 of TS 23.247 [5]) to deliver data to the MBS Client. A set of MBS Distribution Methods is provided by the MBSTF. These provide functionality such as security and key distribution, reliability control (by means of FEC techniques) and associated delivery procedures.

**- Object Distribution Method:** Delivers discrete binary objects over an MBS Session. This may be used to support real-time distribution of media segments (as special objects) including Low-Latency CMAF segments.

The use of MBS Sessions by the Object distribution method is specified in clause 6.1.

**- [Packet|PDU] delivery method:** Supports IP streaming use cases for which UDP payloads (also referred to as Service Data Unit) are distributed as part of UDP or IP flows carried to the UE over an MBS session. Examples of higher layer protocols are RTP [8] and packetized MPEG-2 Transport Stream [9].

The use of MBS Sessions by the [Packet|PDU] distribution method is specified in clause 6.2.

Editor’s Note: The name of this distribution method is pending further discussion. For example, transparent mode was suggested. The discussion was around whether to describe the MBS distribution function or the service that is supported to the outside by the distribution.

The above Distribution Methods may use either a multicast MBS Session or a broadcast MBS Session to distribute content to a MBS Client, and may also make use of a set of MBS associated delivery procedures.

NEXT CHANGE

## 4.3 Functional entities

Editor’s Note: Reference architecture for MBS User Services, including client functions.

Figure 4.3-1 shows the complete set of functional entities involved in supporting MBS User Services when the MBS Application Provider is deployed in the Trusted DN, including client functions in the UE.



NOTE: When the MBS Application Provider is deployed outside the Trusted DN, it interacts with the MBSF via the NEF at reference point N33, as descried in clause 4.2.2.1, instead of via Nmb10.

Figure 4.3-1 MBS User Service reference architecture

In the architecture above, MBS-specific functions such as the MBS AS and MBSF are shown as independent and standalone. In deployments, they may be co-located on physical devices with other functions. As an example, the MBS AS may be hosted in the MBS Application Provider domain, or it may be hosted in a 5GMS AS.

NEXT CHANGE

## 4.4 Reference points and interfaces

4.4.1 Overview

The following reference points defined in clause 5.1 of TS 23.247 [5] are relevant to MBS User Services architecture: Nmb1, Nmb2, Nmb5, Nmb8, Nmb9, Nmb10 and Nmb12.

The following additional reference points are defined by the present document:

**- MBS-4-MC:** Unidirectional multicast distribution of content from the MBSTF to the MBS Client.

**- MBS-4-UC:** File-based unicast repair between the MBS Client and the MBS AS.

**- MBS-5:** Interactions between the MBS Client and the MBSF for the purpose of MBS control plane and service handling.

**- MBS-6:** API exposed by the MBS Client and used by the MBS-Aware Application to manage and control MBS User Services.

**- MBS-7:** API exposed by the MBS Client and used by the MBS-Aware Application to receive user data information about MBS User Services.

**- MBS-8:** Announcement of MBS User Services to the MBS-Aware Appliction by the MBS Application Provider.

4.4.2 Northbound Interfaces Nmb8 and Nmb10

Editor’s Note

This section deals with:

3. Provide the relevant functions and protocols for northbound interfaces based on the xMB API defined in TS 26.348.

For the northbound interfaces the following is agreed:

* Reuse to the most extent the definitions from TS 26.348.
* Modify TS 26.348 with the following functionalities:
	+ An MBS User Service may consist of multiple flows.
	+ Provide the ability to configure all defined MBS Delivery Methods.
	+ Simplify and remove any unnecessary functionalities.
	+ Take the concepts from xMB-C and to re-cast them as a more modern API design.
* Separate Nmb10 (xMB-C) and Nmb8 (xMB-U) as they are quite different.

4.4.3 Internal Network Interfaces Nmb1, Nmb2, Nmb5, Nmb9 and Nmb12

4.4.4 User Service Interfaces MBS-4, MBS-5 and MBS-8

4.4.5 Client Interfaces MBS-6 and MBS-7

Editor’s Note

This section deals with:

5. Define the User Plane and Control Plane Functionalities/APIs of the 5MBS Client based on the MBMS Client functions as defined in TS 26.347 (Clause 6 is control, clause 7 is user-plane).

For client APIs, it is agreed:

* Reuse TS 26.347 as is, but update the mapping description between user service parameters and APIs.
* Generalize the service APIs across different MBS Delivery Methods,
* Add low-latency streaming to the user plane interface, supporting:
	+ Chunked HTTP delivery.
	+ Possibly partial access to data.
* Create signalling and APIs that make the application as “unaware” as possible of specific 5MBS delivery. Expected that there are two options:
	+ *MBMS-Aware mode:* MBS-Aware Application wakes up the MBS Client based on MBS Application-Service announcement information it has received via MBS-8.
	+ *Transparent proxy mode:* MBSF Client is a background service that monitors service announcements and intercepts application HTTP requests for unicast to include MBS delivery.
* Service announcement aspects of the client APIs follow a subscribe–notify design pattern similar to those of the 5GMS Media Session Handler.

NEXT CHANGE

4.5 Domain model

Based on the above discussion, the following definitions are proposed:

**MBS Application Service**: An end-user service for which parts or all of the data are accessible by joining an MBS User Service.

**MBS User Service:** A transport-level service configured by the MBSF and using one or more MBS Delivery Sessions, possibly in combination with unicast delivery methods to deliver an Application Service.

**MBS Application ingest session:** time, protocols and protocol state (i.e. parameters) provided by an 5MBS application provider for delivery over 5MBS and provided to the 5MBS aware application as an MBS Application Data Session.

**MBS Application data session:** time, protocols and protocol state (i.e. parameters) provided by the MBSTF Client to the 5MBS aware application.

This concept is now also presented in Figure 4.5-1.



**Figure 4.5-1: Service and Session Oriented Architecture**

Initial session and service procedures are provided in Figure 4.5-2.



**Figure 4.5-2 MBS User Service Workflow**

Editor’s Note: This diagram needs some updates to express parallel workflows and so on.

In this case

1. The MBS Application Service is provisioned though Nmb10.
2. The MBSF provisions the MBS Delivery Session(s) in the MBSTF.
3. The MBS User Service announcement is prepared for being accessed by the MBSF Client.
4. The MBS Application Service is announced to the MBS-Aware Application.
5. Application data is ingested as part of an MBS Application Data Session.

NOTE: The actual data ingest (Step 5) may happen after the session announcement (Step 7) or even after the session join (step 9) in case of multicast sessions.

1. The MBS-Aware Application requests to join an MBS User Service.
2. The MBSF Client discovers the service.

NOTE: The MBSF Client may have already discovered the MBS User Service at an earlier point.

1. The MBSF Client provides the session information to the MBSTF Client.
2. The MBSTF Client based on this information joins the service.

NOTE: In broadcast the joining is not sent to the MBSTF, but only happens on the device

1. Ongoing handling of the MBS User Services session between the MBSF Client and the MBSF.
2. The MBS Delivery Session is in place.
3. The MBSTF provides the information about the MBS User Services session to the MBS-Aware Application through MBS-7.
4. The MBS User Services session is controlled by the MBS-Aware Application.

END OF CHANGES